

Management of a urine burn on the foot of a person with undiagnosed diabetes

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This case report describes a man with undiagnosed type 2 diabetes and peripheral neuropathy who presented with a widespread wound to his left foot consistent with a burn. The patient was found to be incontinent and urine leakage down the man's leg and into a slipper had caused tissue damage to his foot. A hospital-base multidisciplinary team addressed the man's diabetes, wound, and incontinence and full healing was achieved.

A 79-year-old man – Mr U – presented to the accident and emergency department of the author's hospital having collapsed at home. He was brought to hospital by a neighbour who reported that the man had a recent history of falls.

At presentation the man was apyrexial and his left foot was hot, red, and exuding. The patient did not report any pain, but reported extreme thirst and polyuria. He was not currently taking any medications and had no medical history of note. Blood samples were taken and sent for assessment.

A random glucose test revealed the man's blood glucose to be 12.5 mmol/L and he was diagnosed with type 2 diabetes and initially treated with metformin (500 mg twice per day). Mr U was referred to the hospital's diabetic foot care multidisciplinary team (MDT) within 3 hours of his medical admissions review as per NICE guidance (2011).

Mr U was reviewed by the diabetes specialist podiatrist. Both of his slippers (in which he had presented) were removed, the left slipper was soaked with urine. The right foot was unharmed with the exception of some slight bruising to the toes caused by the fall. The left foot was covered by an extensive wound, consistent with a burn. The second and third toes had fused together and the extensor tendons on the dorsum of the foot were exposed (*Figures 1*).

Mr U reported that he was completely unaware of the wound. The pattern of the wound borders

matched the top edges of the slipper. On discussion, the patient recalled that after going to the toilet he often experienced some urine leakage. He reported that recently, as he had been feeling particularly unwell, he often slept in the same armchair with his slippers on. As the wound could not be linked to any other obvious caustic or chemical agent, and the patient was unaware that his slipper had been soaked with urine, it was postulated that it was a urine burn complicated by infection.

Both feet were tested using a 10-g monofilament and a 128-mgHz tuning fork. The patient had sensory neuropathy with a loss of vibration, monofilament and pain sensation.

An urgent magnetic resonance imaging scan was undertaken but showed no damage to the deeper structures of the foot, or gas or deep abscesses.

Mr U had palpable foot pulses that were bounding and consistent with neuropathy. He was seen by the vascular consultant (who was on the ward and was the on-call surgeon at the time), but neither vascular nor surgical intervention were necessary.

Care plan

Diabetes management

The diabetes specialist nurse saw Mr U immediately and an HbA_{1c} was requested. Gliclazide (40 mg, twice per day) was prescribed to improve his glycaemic control and alleviate hyperglycaemic symptoms. His blood glucose improved over the following 3 days to within a range of 4.8–

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Article points

1. Urgent inpatient diabetic foot problems should be seen by the multidisciplinary team within 24 hours.
2. This case illustrates the risk of skin damage associated with incontinence in people with peripheral diabetic neuropathy.

Key words

- Incontinence
- Multidisciplinary team
- Neuropathy
- Urine burn

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Figure 1. Patient on presentation with an extensive wound caused by urine burns. Note that the second and third toes are fused together.



8.7 mmol/L. Verbal and written diabetes advice was provided to the patient.

Mr U was moved to the diabetes ward under the care of the diabetes consultant and the diabetes podiatrist.

Infection control

The patient was given intravenous benzylpenicillin (1.2g) 6-hourly, flucloxacillin (2g) 6-hourly, and oral metronidazole (400mg) three times per day, for 10 days. After 10 days, these antibiotics were discontinued and oral flucloxacillin (500mg, four times per day) were prescribed for the next 4 weeks. Mr U tolerated the antibiotics well.

Blood work from the time of admission indicated an elevated C-reactive protein level (195 mg/L). After 10 days, Mr U's C-reactive protein levels dropped to 11 mg/L.

Continence care

Mr U was referred to the urologist. Assessment indicated that he was unable to fully empty his

bladder, resulting in some leakage of residual urine. After consideration of the options (NICE, 2010), Mr U undertook intermittent self-catheterisation, which he managed well.

Wound care

Due to the extent of Mr U's wound, a skin graft was considered for primary closure, but as initial healing was good, skin grafting was decided against. The MDT and Mr U agreed on a course of conservative treatment to heal the wound.

Sharp debridement was undertaken weekly by the specialist podiatrist for a total of 5 weeks. The fused second and third toes were safely separated 12 days after admission.

The wound was cleansed with sterile saline and dressed with Flaminal® Forte gel (Crawford Healthcare), sterile gauze, loose Soffban® (BSN Medical), and K-Lite (Urgo Medical) bandages daily. Flaminal® Forte gel was selected to manage local infection, which Mr U was at high risk of due to the period of uncontrolled hyperglycaemic that he had just experienced. The patient did not report any pain during dressing change.

Mobilisation

As Mr U's wound was not associated with increased local pressure, the specialist podiatrist advised that mobilisation should be encouraged to aid blood flow to the area. Mr U was assessed by the rehabilitation physiotherapist and occupational therapist and was then mobilised regularly, initially using a walking frame, while wearing Kerraped® shoes (Crawford Healthcare, UK). As per NICE (2005), Mr U was also supplied with an air mattress to use when resting to avoid pressure ulceration.

Discharge and follow-up care

Mr U was discharged 20 days after admission (Figure 2). His wound dressing regimen was reviewed and the Flaminal Forte switched to Flaminal Hydro (Crawford Healthcare) as the wound's exudate level reduced. He was discharged with a care plan for fully-mobile respite care, and was to be reviewed and debrided as an outpatient by the specialist podiatrist on a weekly basis with between-visit wound care to be provided by the community nurses.



Figure 2. The wound 20 days after presentation. Note that the wound is less "wet".

The wound was fully healed 6 weeks after initial presentation (*Figure 3*). Mr U and was moved into specialist diabetic shoes and contoured insoles by the orthotist. He was referred to dermatology for review of the healed, pigmented skin, and followed up by urology for the ongoing management of his incontinence. The community podiatry team, and the diabetes specialist nurses, continue to review and support Mr U in managing his diabetes and preventing reulceration.

Discussion

Care provided by an MDT is the gold standard for the treatment of diabetic foot ulceration, and many studies have demonstrated the benefits of the hospital-based MDT – especially with regard to reductions in major amputation rates (Williams, 2008). However, patients may require further referrals for input from other specialists – in this case, to address incontinence.

Diabetes can result in a range of bladder problems (Fonda et al, 2005) and was the likely cause of incontinence observed in the present case. Leakage of residual urine pooled in Mr U's slippers, and went undetected due to his loss of peripheral sensation also associated with diabetes, which itself was undiagnosed. When the skin is exposed to urine for extended periods it can "burn" the skin, increasing its permeability and reducing its ability to act as a barrier to pathogens (Beeckman et al, 2010).

Incontinence can be managed in a range of ways, and it is important to assess bladder function, severity of symptoms, and patient preference and ability before considering an intervention (Wilkinson, 2009). In the present case, Mr U's incontinence had placed him at increased risk of skin damage.

Conclusion

This case illustrates that successful management of diabetic foot complications requires rapid access to appropriately skilled healthcare professional and facilities, care planning involving clinicians and the patient. Having presented following a fall, Mr U was diagnosed with diabetes, an extensive foot wound, and incontinence. Mr U was treated holistically and in accordance with NICE guidance, and the outcomes for this patient were positive. ■

Figure 3. The healed wound.



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